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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/032,279	12/31/2001	Rajinder Dhindsa	2328-059	4056
22429	7590	03/19/2004	EXAMINER	
LOWE HAUPTMAN GILMAN AND BERNER, LLP			CROWELL, ANNA M	
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SUITE 300 /310			PAPER NUMBER	
ALEXANDRIA, VA 22314			1763	

DATE MAILED: 03/19/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/032,279	DHINDSA ET AL.	
	Examiner	Art Unit	
	Michelle Crowell	1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on May 27, 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 21-65 is/are pending in the application.
- 4a) Of the above claim(s) 64 and 65 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 21-63 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>07-18-02 & 05-27-03</u> . | 6) <input type="checkbox"/> Other: _____ |

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DETAILED ACTION

Election/Restrictions

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:

I. Claims 21-63, drawn to an apparatus, classified in class 156, subclass 345.47.

II. Claim 64-65, drawn to a method, classified in class 438, subclass 710.

2. Inventions II and I are related as process and apparatus for its practice. The inventions are distinct if it can be shown that either: (1) the process as claimed can be practiced by another materially different apparatus or by hand, or (2) the apparatus as claimed can be used to practice another and materially different process. (MPEP § 806.05(e)). In this case, the apparatus as claimed can be used to practice another and materially different process, such as plasma treating chamber components.

3. Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.

4. During a telephone conversation with Mr. Allan Lowe on March 1, 2004 a provisional election was made with traverse to prosecute the invention of Group I, claims 21-63.

Affirmation of this election must be made by applicant in replying to this Office action. Claims 64-65 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

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5. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Claim Rejections - 35 USC § 112

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claims 22-30, 35-41, and 52-63 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

8. Claims 22, 26-30, and 37-41 recite the limitation "the another electrode". There is insufficient antecedent basis for this limitation in the claim. Examiner suggests, "the **first** electrode".

9. Claims 24, 26-30, 35, 37-41 recite the limitation, "the electrode" which is unclear since two electrodes are recited in the base claims. Examiner suggests, "the **second** electrode".

10. Claims 27-30 and 48-40 recite the limitation, "the excitation region geometry" which is unclear. It is unclear how the geometry relates to the current flow. In addition, it is unclear what structure is required to achieve the claimed geometry.

11. Claim 52 recites the limitation "the plasma confinement region inlet and outlet". There is insufficient antecedent basis for this limitation in the claim.

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12. Claim 59 is unclear since it depends on claim 59 (see 35 U.S.C. 112 specification, paragraph 4).

Claim Rejections - 35 USC § 102

13. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

14. Claim 21 is rejected under 35 U.S.C. 102(b) as being anticipated by Lenz et al. (US 5,534,751).

Referring to Figure 1 and column 5, line 16-column 6, line 29, Lenz et al. discloses a vacuum plasma chamber 11 for processing a workpiece 33, the chamber including: a first electrode 14 for electrical coupling with gas in the chamber and for connection to a first relatively high frequency RF source 24, a second electrode 13 for carrying the workpiece and electrical coupling with the gas in the chamber and for connection to a second relatively low frequency RF source 23, an exterior wall 11 at a reference potential, and plasma excitation region 17 for confining the plasma, the region being spaced from the exterior wall.

15. Claim 21-25, 31, 33-36, 42, and 44-48 are rejected under 35 U.S.C. 102(a) as being anticipated by Li et al. (U.S. 6,178,919).

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Referring to Figure 3 and column 4, line 46-column 5, line 51, Li et al. discloses a vacuum plasma chamber 202 for processing a workpiece 214, the chamber including: a first electrode 204 for electrical coupling with gas in the chamber and for connection to a first relatively high frequency RF source 206 (col. 4, lines 53-56), a second electrode 210 for carrying the workpiece and electrical coupling with the gas in the chamber and for connection to a second relatively low frequency RF source 212 (col. 4, lines 62-65), an exterior wall 202 at a reference potential (col. 4, lines 51-53), and plasma excitation region 228 for confining the plasma, the region being spaced from the exterior wall.

With respect to claims 22 and 33, the chamber further includes the plasma excitation region having louvers 220, 222 connected to the reference potential and spaced from the wall, the plasma excitation region being arranged so that the gas flows into the plasma excitation region through the another electrode 206 and out of the plasma excitation region between the louvers 222 (col. 5, lines 13-31).

With respect to claims 23 and 34, the chamber further includes that the plasma excitation region is bounded by the electrodes 204, 210 and louvers 220, 222 (see Fig. 3).

With respect to claims 24 and 35, the chamber further includes that the plasma excitation region is symmetrical with respect to the chamber exterior wall 202 and a center point on the electrode 210 for carrying the workpiece (see Fig. 3).

With respect to claims 25 and 36, the chamber further includes that the plasma excitation region is arranged so that the spacing between the electrodes 204, 210 can be changed at will (col. 5, lines 36-44).

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With respect to claims 31 and 42, the chamber further includes a processor including the first and second RF sources 206, 212, the first RF source 206 being connected to the first electrode 204, the second RF source 212 being connected to the second electrode 210 (col. 4, lines 53-54, col. 4, lines 62-64).

With respect to claim 44, the chamber further includes a third electrode 222 connected to a reference potential inside a plasma excitation region (see Fig. 3).

With respect to claim 45, the chamber further includes that the excitation region 228 and a chamber wall 202 are substantially isolated from each other by a plasma confinement arrangement 220, 222 (col. 5, lines 32-36).

With respect to claim 46, the chamber further includes that the confinement arrangement 220, 222 includes an arrangement for passing the gas from inside the excitation region to outside the excitation region for affecting the gas pressure in the region (col. 6, line 39-col. 7, line 17, esp. col. 7, lines 7-17).

With respect to claim 47, the chamber further includes that the excitation region includes a louver arrangement 220, 222 for substantially confining the plasma to the region (col. 5, lines 32-36).

With respect to claim 48, the chamber further includes louvers 222 of the louver arrangement have high electrical conductivity and are at the reference potential (col. 5, lines 17-19).

Claim Rejections - 35 USC § 103

16. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

17. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

18. Claims 26-30 and 37-41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Li et al. (U.S. 6,178,919) in view of Lenz (U.S. 5,998,932).

The teachings of Li et al. have been discussed above.

Li et al. fails to teach first and second surfaces at a reference potential.

Referring to column 4, line 61-column 5, line 17, Lenz teaches a plasma processing apparatus using surfaces 304a and 304b at a reference potential to eliminate or reduce unconfined plasma and thereby improve process control (col. 4, lines 8-13). Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide first and second surfaces of Li et al. with a reference potential as taught by Lenz in order to eliminate or reduce unconfined plasma and thereby improve process control.

With respect to claims 27-30 and 38-41, the apparatus of Li et al. in view of Lenz includes the structure of an electrode for carrying the workpiece, another electrode, and first and

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second surfaces at a reference potential, and therefore the apparatus is capable of performing the intended operations.

19. Claims 32 and 43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Li et al. (U.S. 6,178,919) in view of Nakano et al. (U.S. 6,270,618).

The teachings of Li et al. have been discussed above.

Li et al. fails to teach a filter arrangement wherein the current from the second RF source flows to the first and second electrodes.

Referring to Figure 1 and column 3, lines 30-59, Nakano et al. teaches a plasma processing apparatus having a filter arrangement 61a and 61b wherein the current from the second RF source flows to the first and second electrodes. This filter arrangement traps plasma between the electrodes 4 and 8. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the filter arrangement of Li et al. with the capability of flowing current from the second RF source to the first and second electrodes as taught by Nakano et al. in order to efficiently trap plasma between the electrodes.

20. Claims 49-51 are rejected under 35 U.S.C. 103(a) as being unpatentable over Li et al. (U.S. 6,178,919) in view of Lenz et al. (U.S. 5,534,751).

The teachings of Li et al. have been discussed above.

Li et al. fails to teach a pair of louvers for mechanical confinement with adjustable spacing.

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Referring to Figure 3 and column 4, lines 1-5, Li et al. discloses an electrically floating louver 202 which prevents the plasma from grounding through the chamber walls. Referring to Figure 1 and column 6, line 8-column 7, line 53, Lenz et al. teaches a louver arrangement with a pair of louvers 30 for mechanical confinement with adjustable spacing so that charged particles of the spent gases in the plasma exiting the interaction space are neutralized by the louvers as the gases exit through the spaces. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the louver arrangement of Li et al. with a pair of louvers for mechanical confinement with adjustable spacing as taught by Lenz et al. so that charged particles of the spent gases in the plasma exiting the interaction space are neutralized by the louvers as the gases exit through the spaces.

21. Claims 52-57, and 59 are rejected under 35 U.S.C. 103(a) as being unpatentable over Li et al. (U.S. 6,178,919) in view of Jansen (U.S. 4,612,207).

Referring to Figure 3 and column 4, line 46-column 5, line 51, Li et al. discloses a vacuum plasma chamber 202 having a wall arrangement 202 with a plasma confinement region 228 located in the chamber so it is spaced from the wall arrangement; a gas confinement region having a gas inlet 205 and gas outlet 226 (col. 4, lines 55-60, col. 5, lines 21-23); and a plasma excitation arrangement 204, 210 for coupling a plasma exciting field to gas in the plasma confinement region;(col. 4, lines 50-65), the plasma confinement region being arranged to have the workpiece therein; the plasma confinement region inlet and outlet being arranged for causing gas flowing through the inlet to flow into substantial amount of plasma to flow from the region

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into the remainder of the chamber. In addition, louvers 220, 222 are provided to the apparatus and both louver 222 and wall arrangement 202 are at the same potential.

Li et al. fails to teach a sensor, regulator, feedback arrangement.

Referring to Figure 1 and column 5, lines 36-44, Jansen teaches a plasma processing apparatus using a sensor 16, a regulator, and a feedback arrangement to achieve the desired pressure. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the apparatus of Li et al. with a sensor, a regulator, and a feedback arrangement as taught by Jansen since this would achieve the optimum pressure for the desired process.

Li et al. in view of Jansen fails to teach a pressure regulator including a drive for varying the space between the louvers, however it is obvious. It is well known in the art to use a drive to vary the space between louvers, since this will cause an increase or decrease in gas flow rate and as a result an increase or decrease in pressure is achieved. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the pressure regulator of Li et al. in view of Jansen with a drive for varying the space between the louvers since this a known procedure for controlling pressure.

22. Claim 58 is rejected under 35 U.S.C. 103(a) as being unpatentable over Li et al. (U.S. 6,178,919) in view of Jansen (U.S. 4,612,207) as applied to claims 52-57 and 59 above, and further in view of Lenz et al. (U.S. 5,534,751).

The teachings of Li et al. in view of Jansen have been discussed above.

Li et al. in view of Jansen fails to teach louvers electrically floating.

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Referring to Figure 3 and column 4, lines 1-5, Li et al. discloses an electrically floating louver 202 and grounded wall 202 which prevents the plasma from grounding through the chamber walls. Referring to Figure 1 and column 6, line 8-column 7, line 53, Lenz et al. teaches a louver arrangement 30 with several spaced apart louvers so that the charged particles of the spent gases in the plasma exiting the interaction space are neutralized by the louvers as the gases exit through the spaces. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the apparatus of Li et al. in view of with louvers electrically floating as taught by Lenz et al. so that charged particles of the spent gases in the plasma exiting the interaction space are neutralized by the louvers as the gases exit through the spaces.

23. Claims 60-62 are rejected under 35 U.S.C. 103(a) as being unpatentable over Li et al. (U.S. 6,178,919) in view of Jansen (U.S. 4,612,207) as applied to claims 52-57 and 59 above, and further in view of Nakano et al. (U.S. 6,270,618).

The teachings of Li et al. in view of Jansen have been discussed above.

Li et al. in view of Jansen fails to teach a filter arrangement wherein the current from the second low frequency flows to the reactive impedance element and the electrode.

Referring to Figure 1 and column 3, lines 30-59, Nakano et al. teaches a plasma processing apparatus having a filter arrangement 61a and 61b wherein the current from wherein the current from the second low frequency flows to the reactive impedance element and the electrode. This filter arrangement traps plasma between the reactive impedance element 4 and electrode 8. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the filter arrangement of Li et al. with the capability of flowing current from

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the second RF source to the first and second electrodes as taught by Nakano et al. in order to efficiently trap plasma between the reactive impedance element and the electrode.

24. Claim 63 is rejected under 35 U.S.C. 103(a) as being unpatentable over Li et al. (U.S. 6,178,919) in view of Jansen (U.S. 4,612,207) and Nakano et al. (U.S. 6,270,618) as applied to claims 60-62 above, and further in view of Lenz et al. (U.S. 5,534,751).

The teachings of Li et al. in view of Jansen have been discussed above.

Li et al. in view of Jansen fails to teach louvers electrically floating.

Referring to Figure 3 and column 4, lines 1-5, Li et al. discloses an electrically floating louver 202 and grounded wall 202 which prevents the plasma from grounding through the chamber walls. Referring to Figure 1 and column 6, line 8-column 7, line 53, Lenz et al. teaches a louver arrangement 30 with several spaced apart louvers so that the charged particles of the spent gases in the plasma exiting the interaction space are neutralized by the louvers as the gases exit through the spaces. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the apparatus of Li et al. in view of Jansen and Nakano et al. with louvers electrically floating as taught by Lenz et al. so that charged particles of the spent gases in the plasma exiting the interaction space are neutralized by the louvers as the gases exit through the spaces.

Conclusion

25. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Lenz '060, Henderson et al. '130, and Yen et al. '911 teach plasma processing apparatus having a plasma confinement configuration.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michelle Crowell whose telephone number is (571) 272-1432. The examiner can normally be reached on M-F (8:00 - 4:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory Mills can be reached on (571) 272-1439. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

AMC *ame*
03-09-04

P. Hossainzadeh
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AU 1763